

## Revision of the Genus *Pandanus* Stickman, Part 19

### Additional Malayan Species of *Pandanus*

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MOST OF THE MALAYAN SPECIES of *Pandanus* have already been treated by the writer in parts 11, 14, and 15 of this revision. Here are presented descriptions of five of the remaining species.

*Pandanus elostigma* Martelli, Soc. Bot. Ital., Bul. n. s. 11(2):302-303, 1904; Webbia 4(1): 13, 1913; 4(2):t. 30, fig. 9, 1914; Ridley, Fl. Malay Penin. 5:79, 1925. (sect. *Acrostigma*).

Fig. 219

NOM. VERN.: "shidayen masing."

**DIAGNOSIS OF LECTOTYPE:** Apparently a low shrub, growing in clusters of as many as 20; leaves 1-2.24 m long, 18.5-22 mm wide, thick firm chartaceous, above dark bluish green, below bluish green, 1-ribbed, 2-pleated, the central furrow narrow, in section M-shaped, at midsection with 19-22 parallel secondary veins in each half, these prominent throughout, tertiary cross veins visible  $\frac{1}{3}$  way from the base and in outer half conspicuous, more or less transverse and forming short oblong meshes, the blade ligulate but in upper  $\frac{1}{6}$  gradually narrowing to a trigonous subulate apex about 5 cm long, 1.5-2 mm wide, the base unarmed, but beginning 13-16 cm up the margins with prickles 0.6-0.9 mm long, 3-5 mm apart, heavy subulate, ascending, pale; the midrib below with a few prickles beginning at 10.5 cm up and 1-1.7 mm long, 4-11 mm apart, conic subulate, reflexed; at midsection the margins with delicate prickles 0.4-0.5 mm long, 3-5 mm apart, subulate, closely appressed; the nearby midrib unarmed; on the subulate apex the margins with subulate tipped serrulations 0.3-0.4 mm long, 1-2 mm apart; the midrib below with similar serrulations 1.5-7 mm apart; syncarp 8-12.5 cm long, 5-7.5

cm in diameter, bluish green, solitary, terminal, subglobose; drupes 23-26 mm long, 5-6 mm wide and thick, fusiform, the body 11-13 mm long, oblanceoloid, fleshy but when dry the apex shrunk and much smaller than the flaring base of the pileus; pileus 1.5-2 mm high, smooth, the base discoid, firm, but when dried flaring and undulate; style 9-10 mm long, thick subulate, mostly proximally curved, the lower half with 4-6 sharp angles but the intervals flat or furrowed, the upper half terete; stigma 6-7 mm long, linear, distal, brown, papillose, running to the tip; endocarp centering in lower  $\frac{2}{7}$ , cuneate the walls 0.1 mm thick, pale brown, except near the apex, formed principally of the heavy, longitudinal, marginal fibers, these connected by a thin tissue; apical mesocarp 5 mm long, ellipsoid from a truncate base, containing only the white membranes of an aerenchyma; basal mesocarp fleshy and fibrous.

**LECTOTYPE:** Malay Peninsula, Perak, Larut, in large clusters on rocky soil, 300 to 800 ft alt, Sept. 1884, *Dr. King's Collector* 6,559 (CAL)! Isotype (SING)!

**SPECIMENS EXAMINED:** Malaya, Perak, Larut, open ground, 300 ft alt 1883, *Dr. King's Collector* 3,758 (CAL, SING) This is also in (FI) but by error as 3,755. Malacca, Gaong dalam Ayer Panas, Oct. 1893, *J. S. Goodenough* 1,535 (CAL).

**DISCUSSION:** As Martelli originally described this species from two collections, one is here chosen as lectotype.

The illustrations of two drupes published by Martelli in 1914 show well the remarkable flaring base of the pileus. Our illustration, Figure 219 *b, e*, shows a dried drupe similar to his, but our Figure 219 *a, d*, shows one after boiling. In this one the lower pileus flange has rounded out

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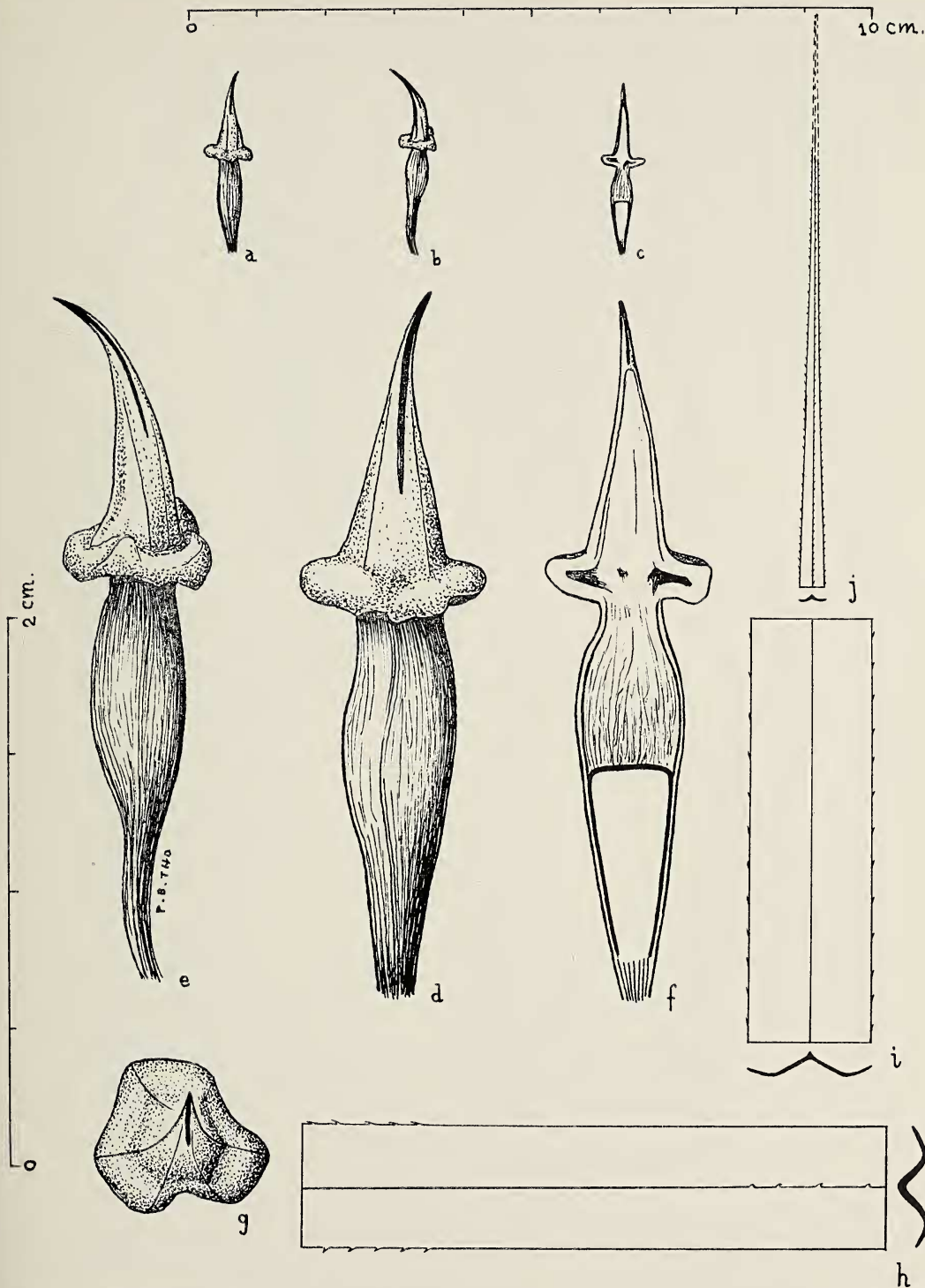
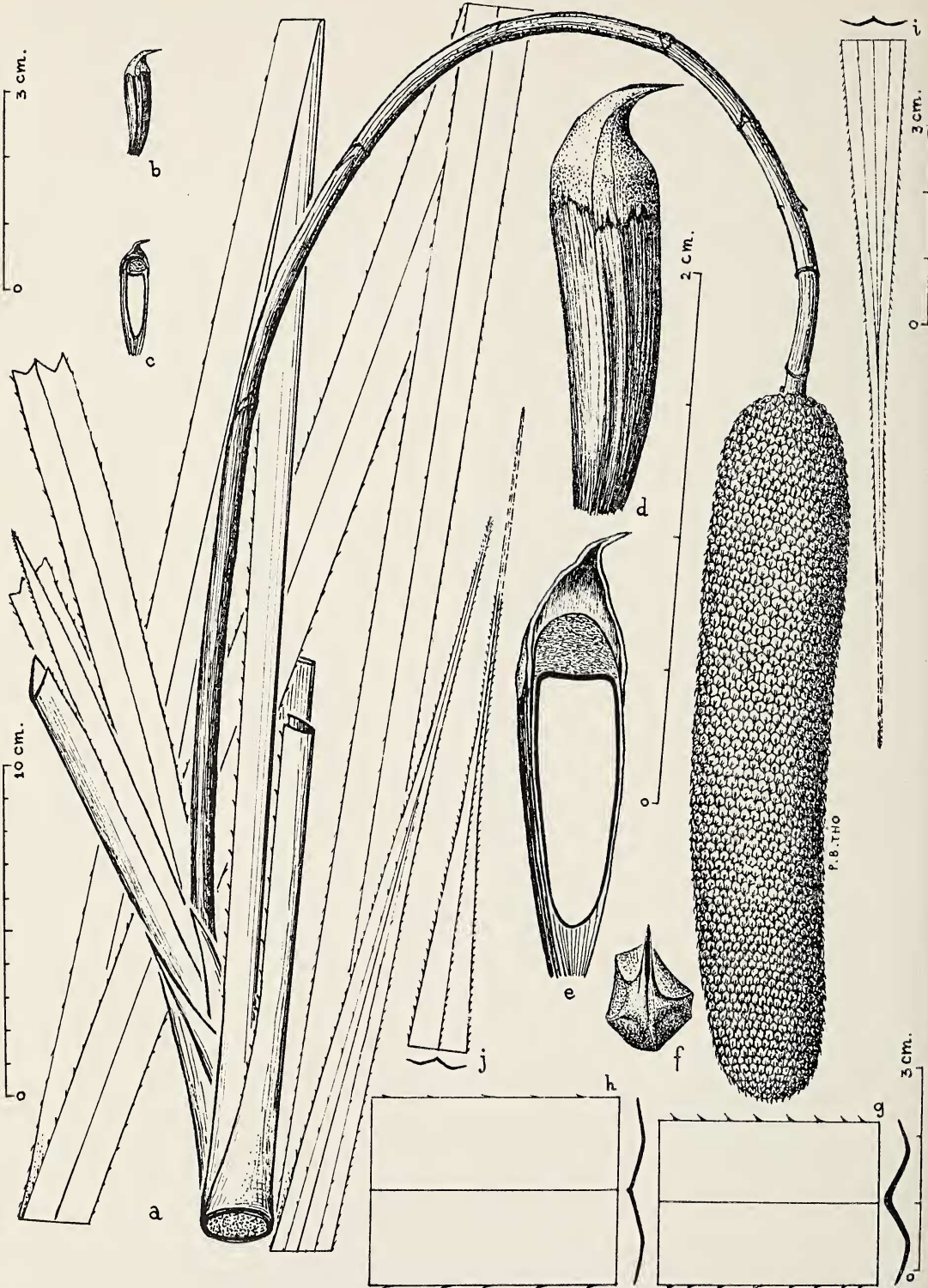


FIG. 219. *Pandanus elostigma* Martelli, from lectotype, Larut, Dr. King's Collector 6,559 (SING). *a, b*, drupe, lateral view,  $\times 1$ ; *c*, drupe, longitudinal median section,  $\times 1$ ; *d*, boiled drupe, lateral view,  $\times 4$ ; *e*, dried drupe, lateral view,  $\times 4$ ; *f*, drupe, longitudinal median section,  $\times 4$ ; *g*, drupe, apical view,  $\times 4$ ; *h*, leaf base, lower side,  $\times 1$ ; *i*, leaf middle, lower side,  $\times 1$ ; *j*, leaf apex, lower side,  $\times 1$ .





and reassumed a horizontal position and with the lower edge revolute. The outer surface of the pileus is hard, almost cartilaginous, but when dried it becomes irregularly wavy. When fresh the fleshy body must have been as wide as the base of the pileus. This species is unique and very distinct.

Martelli described the drupes as 15–17 mm long, but in his life-sized figure he showed them as 28–29 mm long. In the lectotype here described, they are 23–26 mm long. Martelli retained a portion of *Dr. King's Collector* 3,758 (erroneously as 3,755) with two parts of a leaf and 13 loose drupes. These are from 29–33 mm long. It would seem that the measurements given in his publication were erroneous.

*Pandanus recurvatus* sp. nov. (sect. *Acrostigma*).

*Fisquetia ornata* Gaud., Voy. La Bonite, Bot. t. 5, figs. 1, 8, 9, 1843, an invalid name which cannot be transferred.

*P. ornatus* Kurz (as (Gaud.) Kurz), Asiat. Soc. Bengal, Jour. 38(2):147, 1869, but not *P. ornatus* Hort. ex Bull. R. Hort. Soc., Jour. n. s. 1: misc. 1, 1866.

*P. ornatus* Solms-Laubach, Linnaea 42:11, 1878, published without a description; Ridley, Fl. Malay Penin. 5:80, 1925; Martelli, Webbia 4(1):26, 1913.

*P. ornatus* Kurz, forma *spicata* Martelli, Webbia 4(2):432, 1914.

Figs. 220–221

NOM. VERN.: "pandan beduri."

DIAGNOSIS HOLOTYPE: Frutex, foliis 1.68 m longis 2.9 cm latis firme chartaceis supra griseo-viridibus infra pallidis glaucisque supra midnervum U-sulcatis 2-plicatis in sectione mediali cum 27–31 nervis parallelis secundariis in quaque media infra ad apicem cum nervis tertiis transversis reticulis oblongis formantibus laminis ligulatis sed ad apicem in apice trigono subulato 4–7 cm longo diminuentibus basi inermi subcoriacea, marginibus ex 6–8 cm cum aculeis 1.5–2 mm longis 3–7 mm separa-

tis subulatis gracilibus adscendentibus pallidis, midnervo infra per mediam inferam inermi, in sectione mediali marginibus cum aculeis 0.5–1 mm longis 4–11 mm separatis subulatis adpresse adscendentibus, supra in tertia ultima plicis cum subulato-serrulis 0.3–0.5 mm longis 3–10 mm separatis, in apice marginibus et midnervo infra cum serrulis 0.3–0.5 mm longis eis marginalibus 1–2.5 mm separatis illis midnervi 2–4 mm separatis, infructescentia terminali cum syncarpio unico, pedunculo 22 cm longo 7 mm diametro 3-laterato bracteato recurvato, syncarpio 23.4 cm longo 4.2 cm diametro cylindrico cum drupis multitudinis, drupis 18 mm longis 3.4 mm latis et crassis oblongo-ob lanceoloideis 4–6-angulosis apice subulato corpore 9–14 mm longo, pileo 3–4 mm alto obliquiter conico laevi plerumque subangulato, stylo 3.5–5 mm longo subulato rigido valde proxime arcuato, stigmate 2–4 mm longo lineari distali brunneo papilloso, endocarpio in parte  $\frac{1}{3}$  infera lateribus lateralibus 0.1 mm crassis stramineis, mesocarpio apicali meduloso, mesocarpio basali parvo fibroso et carnoso.

#### DESCRIPTION OF ALL SPECIMENS EXAMINED:

Shrub 2–5 m tall, dense, much branched, erect; stem gray, at apex 12–15 mm in diameter, "thorny above," with prop roots 6 mm in diameter; leaves 1.2–2 m long, 1.3–2.9 cm wide, firm chartaceous, grayish green above, pale and glaucous beneath, with a deep furrow above the midrib and 2 lateral pleats, in section M-shaped, the secondary parallel veins visible throughout and at midsection 27–31 in each half, towards the tip on the lower side with a few visible tertiary cross veins making elongate oblong meshes, the blade ligulate, but near the tip gradually tapering into a 4–7 cm subulate, trigonous, caudate tip, 0.5–0.9 mm wide, the base unarmed, firm, subcoriaceous, beginning 6–8 cm up the margins with prickles 1.5–2 mm long, 3–7 mm apart, subulate, diverging or ascending, pale; the midrib below for the lower half unarmed; at midsection the

FIG. 220. *Pandanus recurvatus* St. John, from holotype. *a*, fruiting branch, lateral view,  $\times 1$ ; *b*, drupe, lateral view,  $\times 1$ ; *c*, drupe, longitudinal median section,  $\times 1$ ; *d*, drupe, lateral view,  $\times 4$ ; *e*, drupe, longitudinal median section,  $\times 4$ ; *f*, drupe, apical view,  $\times 4$ ; *g*, leaf base, lower side,  $\times 1$ ; *h*, leaf middle, lower side,  $\times 1$ ; *i*, leaf apex, upper side,  $\times 1$ ; *j*, leaf apex, lower side,  $\times 1$ .



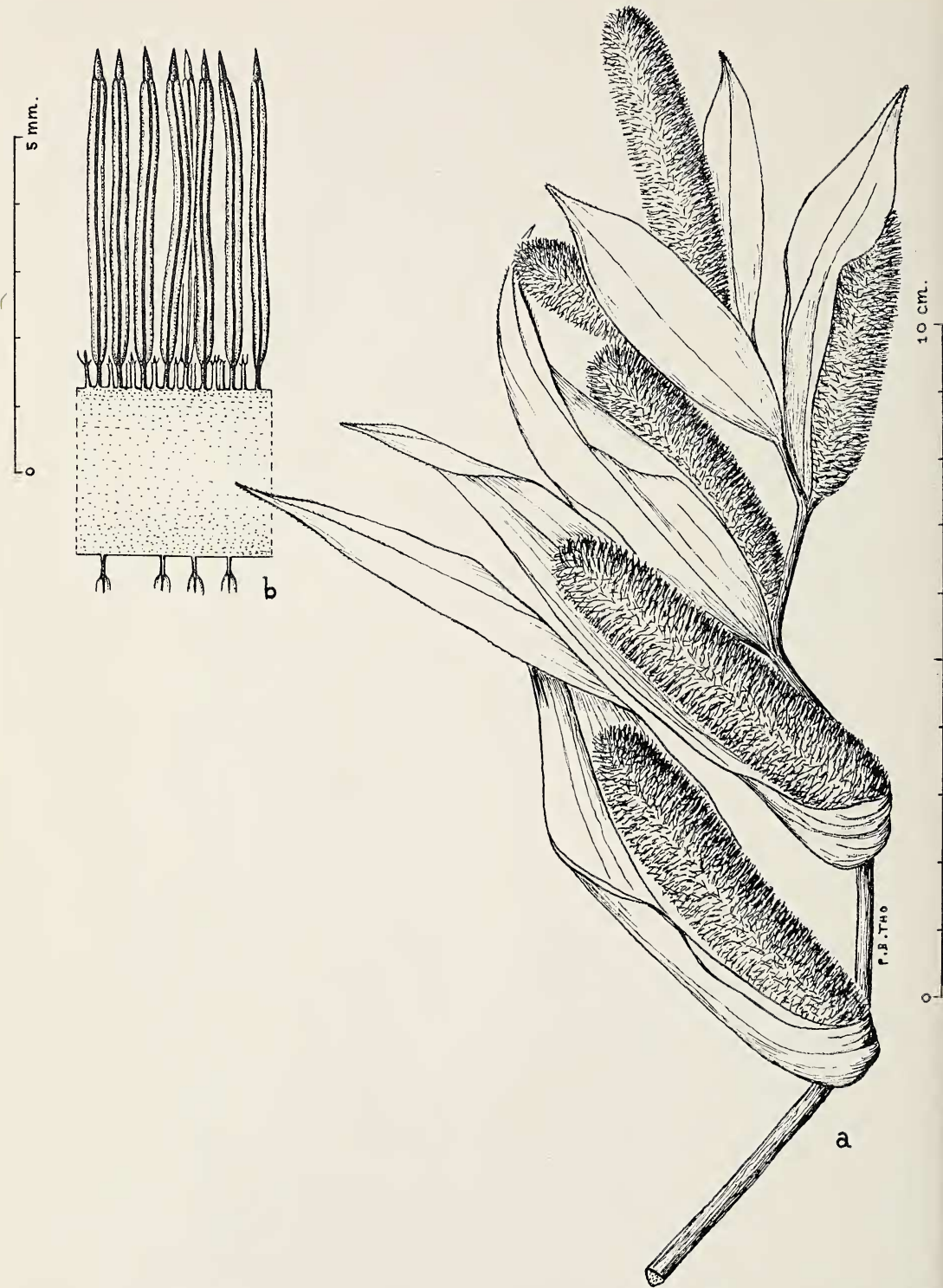


FIG. 221. *Pandanus recurvatus* St. John, from Johore, Ridley 12,143 (SING). *a*, staminate inflorescence,  $\times 1$ ; *b*, spike axis with stamens,  $\times 10$ .

margins with prickles 0.5–1 mm long, 4–11 mm apart, subulate, flat appressed ascending; along the outer third on the upper surface the two lateral pleats with subulate tipped serrations 0.3–0.5 mm long, 3–10 mm apart; on the caudate apex the margins and midrib below with serrations 0.3–0.5 mm long, those on the margins 1–2.5 mm apart, those on the midrib below 2–4 mm apart; pistillate inflorescence terminal, the tip pendent, bearing 1 syncarp (or rarely with 2–5 lateral, smaller, secondary ones); peduncle 20–52 cm long, 4–9 mm in diameter, 3-sided, bracteate; syncarp 12–23 cm long, 2.5–5.5 cm in diameter, cylindric, with obtuse ends, bearing 400–1,728 drupes, these 11–15 mm long, or following the curve of the style 13–18 mm long, 3–4 mm wide and thick, oblong-oblancoate, with a subulate apex, 4–6-angled, the body 9–14 mm long; pileus 2.5–4 mm high, obliquely conic, smooth, usually obscurely angled; style 3.5–5.5 mm long, subulate, sharply arcuate proximally, rigid; stigma 2–4 mm long, linear, distal, brown, papillose; endocarp centering in lower  $\frac{1}{3}$ , the walls 0.1 mm thick, stramineous; apical mesocarp semiorbicular, filled with parenchyma; basal mesocarp sparse, fibrous and fleshy.

**DESCRIPTION OF STAMINATE PLANT** (*Ridley* 12,143): Plant with similar leaves; inflorescence 25 cm long; the bracts colored (white?), subherbaceous; lowest floral bract with a colored base 6 cm long and a foliaceous prolongation 15 cm long, 18 mm wide, ligulate, tapering gradually into a subulate apex; median floral bract 9 cm long, 2 cm wide, lanceolate, unarmed elsewhere, but the tip with margins and midrib below with yellow serrulations 0.2 mm long, crowded; the 7–8 spikes 3–6 cm long, 10–12 mm in diameter, dense, having the odor of crushed leaves of *P. amaryllifolius*; stamens separate, attached directly to the rachis, filaments 0.2–0.3 mm long; anther 3.5–4 mm long, linear, bearing a subulate prolongation of the connective 0.5–0.6 mm long.

**HOLOTYPE:** Malaya, Perak, Taiping Hill, 1,000 ft elev, 17 Feb. 1907, *Md. Haniff & Md. Nur* 2,395 (SING)! Isotype (K)!

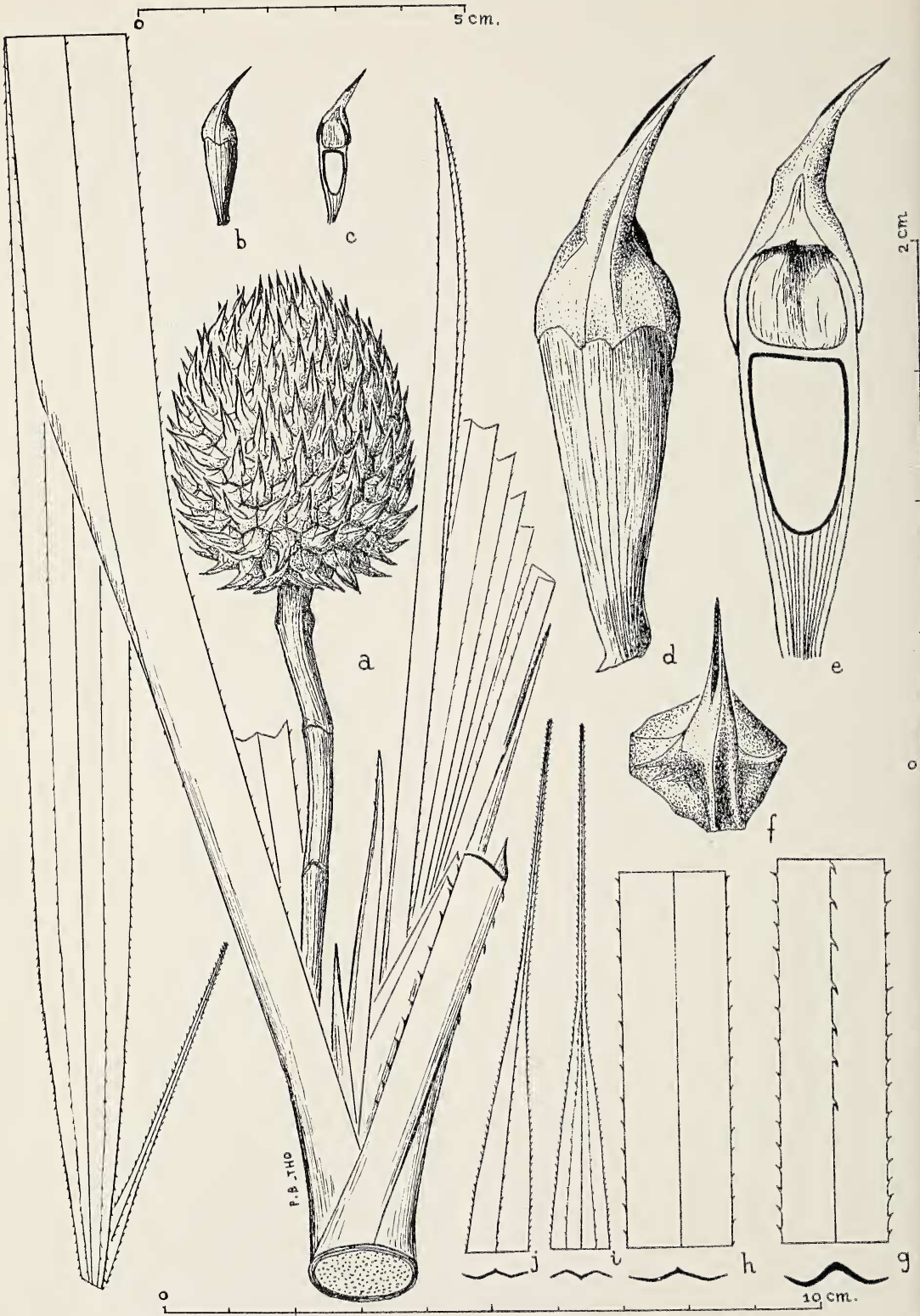
**SPECIMENS EXAMINED:** Malaya, Malacca, *Gaudichaud* (P), holotype of *Fisquetia ornata*

Gaud; also in (G), isotype; and (FI), clastotype; Malacca, without collector (FI); Perak, Larut, Gunong Boobo, 2,500–3,000 ft alt, March 1885, *H. Kunstler* 7,374 (FI); Sungei Penang Rd., 1,000 ft alt, Sept. 1887, *C. Curtis* 1,220 (K); Gunong Bintang, Kedah-Perak Boundary, June 1917, from Fed. Malay States Mus. (K); Tanjong Malim, 3 July 1924, *I. H. Burkill & Md. Haniff* 14,000 (K); Kedah, Koh Moi Forest Res., 5 April 1938, *Kiah* 35,190 (K); Penang, Government Hill, *Ridley* 2,272, type of *P. ornatus* f. *spicatus* Martelli (FI, K); Singapore, Bukit Timah, 1894, *H. N. Ridley* 6,287 (K); Johore, top of St. George, Gunong Pulau, Dec. 1905, *Ridley* 12,143 (K, SING), staminate; Trengganu, S. Trengganu Ferry, 26 April 1937, *E. J. H. Corner* 33,473 (K); Negri Sembilan, Tampin Hill, June 16, 1917, *Ridley* (K); Singapore, cult. in Bot. Garden, 1902, *Ridley* (FI); Johore, 2 miles N. E. of Kampong Sungei Sedili Besar, edge of forest at sea shore, 2 June 1962, *J. Sinclair* 10,703 (E); Kedah, Ulu Sungei Terenas, 20.3.1938, *Sow* 46,187 (KEP); Selangor, Ulu Gombak, 17.6.1931, *C. F. Symington* 24,534 (KEP); Kedah, Kedah Peak, 9.5.1938, *Symington* 46,937 (KEP); ditto, very common near top, 3,700 ft alt, 18/5/1957, *Wyatt-Smith* 79,292 (KEP).

Thailand: Bachaw, Pattāni, evergreen forest, 600 m alt, July 14, 1923, *A. F. G. Kerr* 7,191 (BK).

**DISTRIBUTION:** Throughout Malaya, near streams in lowlands and in forests on hills up to 3,000 ft alt; also in southern Thailand.

**Discussion:** *P. recurvatus* is a member of the section *Rykia*, as is its closest relative, *P. monotheca* Martelli, of Malaya, a species with the peduncle erect; syncarp 5 cm long, ovate-ellipsoid; drupes 10–13 mm long, obovoid or narrowly so, the body 7–9 mm long; pileus broadly ovoid; seed 4–5 mm long, obconic; leaves 0.7–1.1 m long, at midsection with 18 parallel secondary veins in each half, beginning 5 cm up from the base the margins with prickles 2–2.5 mm long, 2–5 mm apart, subulate sigmoid, and the lower ones recurving. *P. recurvatus* has the peduncle recurved; syncarp 12–23 cm long, cylindric; drupes 13–18 mm long, oblong-oblancoate, the body 9–14 mm long;





pileus obliquely conic; seed 9 mm long, narrowly ellipsoid, truncate; leaves 1.2–2 m long, at midsection with 27–31 parallel secondary veins in each half, and beginning 6–8 cm up the margins with prickles 1.5–2 mm long, 4–11 mm apart, subulate, ascending flat appressed.

*P. ornatus* Kurz forma *spicata* Martelli differs from the species only in having two small, lateral, secondary syncarps on the peduncle. This is considered to be a fluctuation within the limits of the species, and not a taxon worthy of classification or naming.

The new epithet is the Latin *recurvatus*, recurved, and is given with reference to the long, recurving peduncle.

*Pandanus ovatus* Warb., in Engler's *Pflanzenreich* IV, 9:80–81, 1900; *P. ovatus* (Gaud.) Kurz, *Asiat. Soc. Bengal., Jour.* 38(2):147, 1869, and *Flora* 52:451, 1869, an invalid name, not accepted by its author; *Fisquetia ovata* Gaud., *Bot. Voy. La Bonite, Atlas* t. 4, fig. 1, 1843, an invalid name published in an undescribed genus (sect. *Acrostigma*).

#### Fig. 222

DESCRIPTION FROM ALL SPECIMENS EXAMINED: Shrub, tufted, tussock-forming, or prostrate; stems to 50 cm long, pale brown, freely forking, at apex 11 mm in diameter; prop roots 4–6 mm in diameter, ridged, unarmed; leaves 73.5–120 cm long, 12–21 mm wide near the middle, firm chartaceous, green above, pale green below, 1-ribbed and deeply furrowed above along the midrib, 2-pleated and in section M-shaped, at midsection on each side with 20–21 parallel secondary veins, these prominent throughout, tertiary cross veins barely visible towards the base, but from the middle outward easily noted, forming elongate oblong meshes, the blade ligulate, but near the apex gradually narrowed to a 2–7 cm subulate, trigonous tip 0.3 mm wide, the base amplexicaul and unarmed, beginning at 3–3.5 cm up the margins with prickles 1.3–1.6 mm long, 3–6 mm apart, subulate, pale, divergent ascending; the midrib below beginning at 6.5–8.5 cm with prickles 1–1.5 mm long, 5–10 mm apart, horn-

like, reflexed; at midsection the margins with prickles 0.5–1 mm long, 2–4 mm apart, subulate, ascending; the midrib below unarmed; in the outer third on the upper surface the 2 lateral pleats bearing prickles 0.5–0.8 mm long, 2–6 mm apart, stout arcuate subulate, ascending, attached either on secondary veins or in the interval between them; on the subulate apex the margins and midrib beneath with prickles 0.3–0.5 mm long, 1–2.5 mm apart, subulate, ascending; pistillate inflorescence terminal, erect, bearing one syncarp; peduncle 6–13 cm long, 4–5 mm in diameter, 3-sided, bracteate; syncarp solitary, 4.5–5.5 cm long, 2–4.3 cm in diameter, broadly ellipsoid to globose, green, with 240–320 drupes, these 21–23 mm long, 4–5 mm wide and thick, fusiform but the tip more slender, 5–7-angled, the body 10–11 mm long, oblanceoloid, obtuse; pileus 9–12 mm long, the base 5–6 mm high, pyramidal-semi-orbicular, with 5–7 prominent angles, smooth; style 6–9 mm long, all but the apical ones curved proximally, slightly angled at base, then subterete; stigma 3–5 mm long, broadly linear, dark brown, papillose, distal, running almost to the tip; endocarp in lower  $\frac{1}{3}$ , inverted bullet-shaped, the walls 0.2 mm thick, bony, stramineous; apical mesocarp 4 mm long, a single cavern, depressed barrel-shaped, with a few large, longitudinal white membranes; basal mesocarp fibrous and fleshy.

HOLOTYPE: *Fisquetia ovata* Gaud., the illustration in *Bot. Voy. La Bonite, Atlas*, t. 4, fig. 1, 1843 which was drawn from the specimen, Malacca, *Gaudichaud* (P). Also there is a clastotype of 12 loose drupes (FI). Specimens examined! Also an isotype (G)!

SPECIMENS EXAMINED: Malaya, Kelantan, Sungei Kete'h, 7 Feb. 1924, *Md. Nur & Foxworthy* 11,988 (SING); Pulo-Pinang [= Penang], *Voyage de la Bonite, mars* 1837, *Gaudichaud* (G-DEL); Kedah, Tampoi For. Res., secondary forest, very common, 200 ft alt, 2/3/1960, *Y. K. Wong* 94,253 (KEP).

FIG. 222. *Pandanus ovatus* Warb., from Sungei Kete'h, *Nur & Foxworthy* 11,988 (SING). *a*, fruiting branch, lateral view,  $\times 1$ ; *b*, drupe, lateral view,  $\times 1$ ; *c*, drupe, longitudinal median section,  $\times 1$ ; *d*, drupe, lateral view,  $\times 4$ ; *e*, drupe, longitudinal median section,  $\times 4$ ; *f*, drupe, apical view,  $\times 4$ ; *g*, leaf base, lower side,  $\times 1$ ; *h*, leaf middle, lower side,  $\times 1$ ; *i*, leaf apex, upper side,  $\times 1$ ; *j*, leaf apex, lower side,  $\times 1$ .

**DISTRIBUTION:** Occurring generally throughout the lowland parts of Malaya.

**DISCUSSION:** Gaudichaud published illustrations and binomials for his four species of *Fisquetia*, but did not describe the genus. Hence, all of these species are invalid and cannot even be transferred.

Kurz transferred Gaudichaud's species to *Pandanus*, but in an uncertain way. In treating the section *Acrostigma* he said, "*P. ovatus* (*Fisquetia ovata*, Gaud., loc. c., t. 4, fig. 1) seems to belong to this section." To the species which he accepted he gave consecutive numbers and printed their binomials in bold face. His *P. ovatus* was left unnumbered and was printed in italics, and he said, "it seems to belong to this section." So, he did not positively accept it. Gaudichaud's species could not be transferred, and Kurz failed to provide a description for it.

Gaudichaud's figure (Voy. La Bonite, Atlas t. 4, fig. 1, 1843) was a large drawing of a leafy branch with syncarp. He made no drawings of the drupes, though he had good fruiting material. His habit drawing is in general good, except that the leaf prickles were shown as too large, too regular, and too close together.

*Pandanus spurius* Miq. cv 'PUTAT' cultivar nov. (sect. *Pandanus*).

*P. moschatus* seu *laevis* Rumph., Herb. Amb. 4:147, 1743.

*P. moschatus* Rumph. ex Miq., Fl. Ind. Bat. 3:165, 1855.

*P. tectorius* Sol., var. *moschatus* (Rumph. ex Miq.) Merr., Interp. Herb. Amb. 81, 1917.

*P. laevis* Lour., Fl. Cochinch. 2:604, 1790, in part, this based on *P. laevis* Rumph. (1743) and on Indochinese plants, part *Corypha*, part *Pandanus*, typified on the Rumphius plant from Amboina, Java, a cultivated plant, sterile, with unarmed leaves, by Kunth, Enum. Pl. 3:100, 1841; later typified by Merrill (1935) on the Indochinese plants described by Loureiro, not yet identified, but incorrectly so, since Kunth

(1841) had already typified it upon a permissible choice (see Merrill, Interp. Rumph. Herb. Amb. 81, 1917).

*P. tectorius* Sol. var. *laevis* (Kunth) Warb., Engler's Pflanzenreich IV, 9:48, 1900.

*P. odoratissimus* L. f. var. *laevis* (Warb.) Martelli, Bishop Mus., Occas. Papers 10(13):21, 1934.

*P. inermis* Roxb., Fl. Ind., ed. Carey, 3:744, 1832.

*P. laevis* Rumph. ex Kunth, Enum. Pl. 3:100, 1841.

*P. laevis* Rumph. ex Willd., Linnaeus, Sp. Pl. ed. by Willd., ed. 4, 4:646, 1805.

*P. laevis* Rumph. ex Solms, Linnaea 42:61, 1878.

*P. tectorius* Sol. forma *laevis* (Kunth) Warb. ex Masamune, Kanazawa Univ., Fac. Sci. Repts. 4(2):202, 1956.

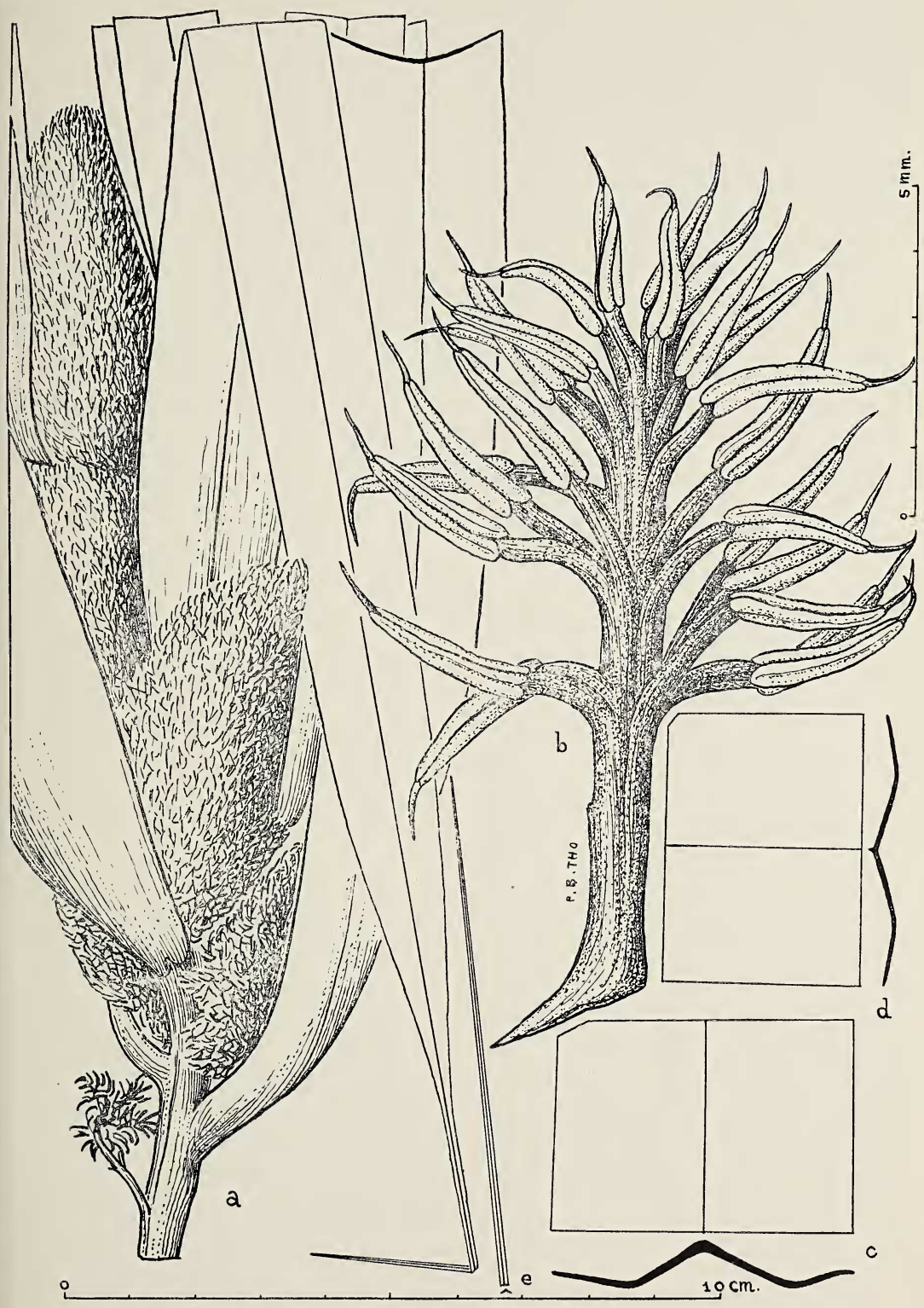
#### Fig. 223

NOM. VERN.: "putat" (Java); "pudak" (Sundanese).

**DESCRIPTION** (from Singapore, *Corner* 32, 763): Forming a tuft 4 m tall; stems silvery buff, shaggy with old leaf bases; prop roots several; leaves 1.43 m long, 4.5 cm wide, completely unarmed, furrowed above the midrib, at midsection with 48 parallel secondary veins in each half, tertiary veins visible below, making square or oblong meshes, coriaceous, green, not glaucous, blade sword-shaped, gradually tapering to a 30–40 cm subulate, trigonous caudate apex, this at the point 10 cm down 1.3 mm wide, the base broadened, amplexicaul; staminate inflorescence 40–70 cm long, drooping, with many creamy yellow bracts, fragrant, the lowest floral bract with a narrowly lanceolate body 30 cm long, 3.5 cm wide, herbaceous, yellow, bearing an apex 51 cm long, narrowly lanceolate, foliaceous, with a long subulate apex; median floral bract 30 cm long, 2.2 cm wide, narrowly lanceolate, herbaceous, unarmed; staminate spikes about 12, cylindric, 4–5 cm long, 1.5–2 cm in diameter, dense; stamens in fascicles 8–12 mm long, with 21–29

FIG. 223. *Pandanus spurius* Miq. cv. 'PUTAT,' from holotype. *a*, staminate inflorescence, lateral view,  $\times 1$ ; *b*, fascicle of stamens,  $\times 10$ ; *c*, leaf base, lower side,  $\times 1$ ; *d*, leaf middle, lower side,  $\times 1$ ; *e*, leaf apex, lower side,  $\times 1$ .







anthers; column 6–9 mm long, anther bearing on upper  $\frac{2}{3}$ 's; free filament tips 1–2 mm long; anthers 1.6–2.2 mm long, narrowly lanceoloid, auriculate at base, bearing at the apex a subulate projection of the connective 0.6–0.9 mm long.

HOLOTYPE: Singapore, Kampong Tanjong, Labrador, cult. for making of mats, 11 March 1937, E. J. H. Corner 32,763 (SING). Iso-type (K)!

SPECIMENS EXAMINED: all in staminate flower.

Java: Hort. Bogor (CAL, L); ex hort. Bogor (CAL); cult. Mus. Heyne, Batavia (L); cult. Museumtuin no. 24 (L); Java, W. H. de Vriese (L); without data (CAL); without data, "puedak" (CAL).

India: H. B. C. (Hortus Botanicus Calcuttensis), (CAL, K); H. B. C., Griffith 6,365 (K); ditto, Wallich 8,589 (K). Without Locality: 1867, Teysmann (L).

DISCUSSION: The above specimens from Java apparently represent *P. moschatus* Rumph. ex Miq., and those from India were the basis of *P. inermis* Roxb.

It is apparent from the habit and from the staminate flowers that this is a member of the section *Pandanus*. The main problem is to decide on the species. It is a plant cultivated by the native peoples from southeastern Asia to the extremes of Polynesia. It is the preferred sort for the making of mats, due to its bland, unarmed leaves. It is mostly sterile, perhaps due to the weakening effect of continual leaf harvests. The natives say that it never bears fruit. Rarely, larger, older plants bear male flowers, as does the Corner 32,763 specimen here described. So, it is a variant, always propagated vegetatively. It appears to have started as a bud sport on a staminate plant of some species of the section *Pandanus*. The staminate flowers of all species in this section are very similar, but only a small percentage of them are described and completely known. The leaves, lacking the spines, are not sufficiently distinctive to help in the specific determination. Earlier botanists described it as a species, then as a variety, under several names, and attached it to several

species. Upon the assumption that all littoral *Pandanus* belonged to a single species, it was attached to either *P. tectorius* Soland. or to *P. odoratissimus* L. f.

It is evident that it is not a species. Probably it is not a hybrid. With little doubt it is a bud sport obtained millenia ago from some wild species. Its current classification should surely be that of a cultivar, and as such it should be attached to a species.

The author now attaches this cultivar to *P. spurius* Miq., a species also native to Amboina. It is of the same section *Pandanus*, and has been well figured and described. Though long misunderstood by botanists who had no specimens, it is now represented by several collections from Amboina in the herbarium at Firenze. In a subsequent part of this revision the writer will present new figures and an expanded description, in order to make *P. spurius* better known. We have not proved that the cv 'PUTAT' was derived from *P. spurius*, but they are of the same section, occur in the same region, and on the same shores and inhabited lowlands. The Ambonese people have long used the leaves of *P. spurius* for matting. If, long ago, they found a spineless bud sport, it is likely that they would have preserved it and multiplied it by stem cuttings.

The name here given to this cultivar is 'PUTAT,' the vernacular name on Java (*vide* Rumphius), now as "pudak," the Sundanese vernacular name (*vide* Koorders).

The classification of this cultivated variety is difficult, and previous botanists have given it many placements. The first good account and naming of this plant was by Rumphius (1743) who gave it the alternative names *P. moschatus* seu *laevis*, but he himself actually accepted *P. moschatus*. In post-Linnaean literature this was validated as *P. moschatus* Rumph. ex Miq. (1855); and as *P. tectorius* Soland. var. *moschatus* (Rumph. ex Miq.) Merr. (1917).

The alternative name given by Rumphius was also republished and validated as *P. laevis* Lour. (1790); as *P. laevis* Rumph. ex Willd (1805); as *P. laevis* Rumph. ex Kunth (1841); as *P. laevis* Rumph. ex Solms (1878); as *P. tectorius* Soland. var. *laevis* (Kunth) Warb. (1900); as *P. tectorius* Soland. forma *laevis*

(Kunth) Warb. ex Masamune (1956); and as *P. odoratissimus* L. f. var. *laevis* (Warb.) Martelli (1934). The first of these, *P. laevis* Lour. was published as a new species, not attributed to Rumphius. Loureiro included a reference to *P. laevis* Rumph. and his description was in part from Cochinchinese plants of *Pandanus*, and with vernacular names of palms in *Corypha*. This was first typified by Kunth (1841) on the Rumphian plants of Amboina. Hence, later interpretations, as that by Merrill, that *P. laevis* Lour. must be applied to the obviously different *Pandanus* seen in Vietnam by Loureiro, were superfluous and illegal. Kunth had already made a possible and legal typification of the species. Nor can combinations based upon *P. laevis* sensu Kunth be used, since he had no independent species, and if he had, it would have been a later homonym of the one by Loureiro. It is possible to use the name *P. tectorius* Soland. var. *laevis* Warb. (1900), as var. *laevis*. Warburg could not legally transfer and adopt *P. laevis* sensu Kunth, but in fact Warburg gave a Latin diagnosis and cited specimens, so var. *laevis* has a legitimate beginning with Warburg in 1900.

Warburg also cited as synonyms *P. moschatus* s. *laevis* Rumph. and *P. moschatus* Miq. For localities he listed Java, Bali, and Amboina; and quoted Kurz as finding it at Pegu. In the Berlin herbarium there are no such specimens, and the only ones there, and annotated by Warburg, are two from Calcutta, one collected by Guadichaud in Hortus Calcutt. and sent to Kunth in 1841, and the other Herb. Wallich 842B. These contain only staminate inflorescences. Since in preparing his monograph Warburg studied only the specimens in the Berlin museum, it is evident that he based his concept of this plant upon published descriptions, not upon actual specimens.

*P. inermis* Roxb. is a valid name, based upon plants from Amboina cultivated in the Calcutta Botanic Garden. In 1961 this plant was no longer present in the Calcutta Garden, but there were two sheets with male inflorescences so labeled in the Calcutta herbarium and they match the material from Singapore here described as a new cultivar.

Another complication is that *P. tectorius*

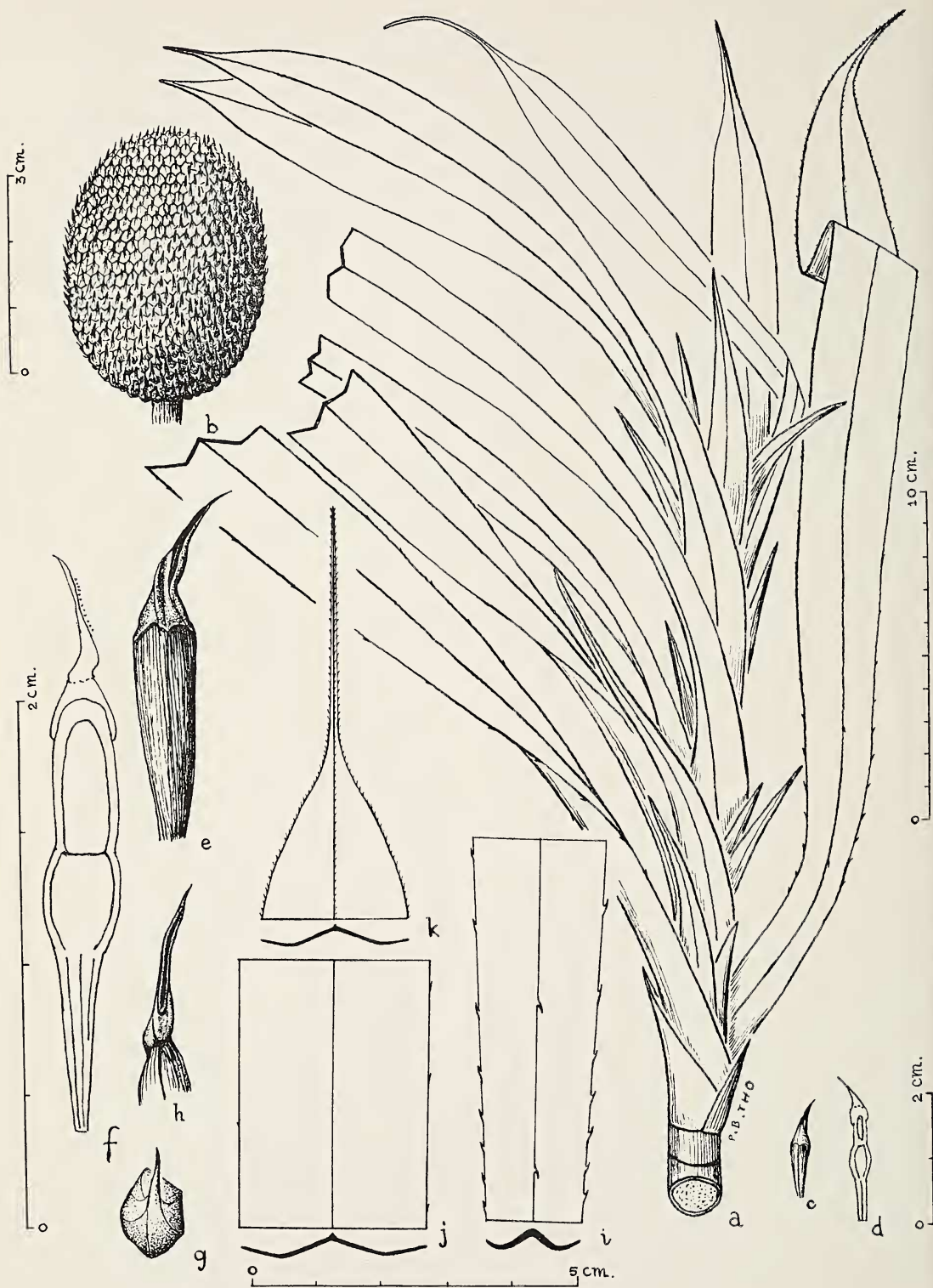
Soland. was merely a manuscript name with an unpublished figure until it was adopted by Warburg in 1900. He gave other references to subsequent authors, but none of these used the name *P. tectorius*. So Warburg himself was the first to print a diagnosis, cite specimens and references. Hence, *P. tectorius* Warb. (1900) is an acceptable name for a Tahitian species, but it is no longer a usable mother species to which all other littoral kinds can be appended as varieties. There are many other older species of the section *Pandanus* which have priority over the binomial by Warburg. Since the writer does not accept this sort of classification, the wholesale grouping of all littoral kinds of *Pandanus* under one species, he is not concerned with which would be the earliest possible collective species for all littoral *Pandanus*. The publication of *P. tectorius* is often attributed to S. Parkinson's Journal (1773), but in this posthumous, non-technical book, the name was printed as a monomial, and hence is invalid.

*Pandanus Scortechinii* Martelli, Soc. Bot. Ital., Bul. n. s. 11(2):302, 1904, (as *Scortechinii*), emended to *Scortechinii* by Martelli, Webbia 4(1):30, 78, 96, 1913; and 4(2):t.34, fig. 12-15, 1914 (sect. *Rykia*).

Fig. 224

DIAGNOSIS OF LECTOTYPE: Pistillate plants with the stem 60-120 cm tall, 13 mm in diameter, yellowish, smooth, shining; leaves 25-33 cm long, 1.9-3.1 cm wide near the middle, 1.4 cm wide near the base, thick chartaceous, only the midrib thickened, but the blade 2-pleated, cuneate to near the expanded, unarmed base, the midsection almost ligulate, then near the tip suddenly contracted to a caudate, subulate, trigonous apex 3 cm long, this 2 cm down 1.3 mm wide, the blade 1-ribbed, but pleated and in section M-shaped, above dark green, below paler, the secondary parallel veins conspicuous and at midsection 15-16 in each half, below in outer half the tertiary cross veins visible, almost transverse, making squarish meshes, beginning at 3-4 cm from the base the margins with prickles 2-2.3 mm long, 3-6 mm apart, subulate, ascending, brown tipped; the midrib below beginning at 5-6 cm up with 1-2 reflexed serrulations 0.5-1 mm long, and if two 19 mm







apart; at midsection the margins with weak prickles 0.2–0.3 mm long, flat appressed, ascending, close or remote or none; the midrib below unarmed; on the caudate apex the margins with teeth 0.3–0.7 mm long, 1–1.5 mm apart, subulate tipped serrulations; the midrib below with similar ones but 1–3 mm apart; syncarp 4–5 cm long, 3–3.5 cm in diameter, erect, single, oval; drupes numerous, 12–22 mm long, 1.5–3 mm wide and thick, oblong-fusiform, 4–6-angled, the body 7–18 mm long; pileus 2–3 mm high, ovoid; style 4–5 mm long, subulate from a broad, compressed base, pale, cartilaginous; stigma 2.5–3 mm long, proximal, linear, not reaching the apex, brown, papillose; endocarp in lower  $\frac{1}{3}$ , cartilaginous, the walls stramineous, 0.1 mm thick, 6 mm long, ellipsoid but smaller towards the base; seed 3 mm long, ellipsoid; apical mesocarp a slender ellipsoid cavern 5–6 mm long; basal mesocarp with fibers up the sides, the center fleshy but when dried hollow.

LECTOTYPE: Malaya, Perak, Larut, to 300 ft alt, 1882, *Dr. King's Collector* 3,557 (CAL)! Isotype (SING)! and (FI)!

SPECIMENS EXAMINED: Malaya, Dindings [= Perak], new road from Bruas to Sungei Rotan, Feb. 1900, *C. Curtis* (SING); Perak, Larut, very wet places, rich soil, dense jungle, 300 ft alt, June 1882, *H. Kunstler* 3,085 (CAL); without locality, *Scortechinii* (CAL); plains, Kota, Oct. 1888, *L. Wray Jr.* 3,260 (CAL); Kota, Thaiping, plains, Oct. *L. Wray Jr.* 5,797 (SING).

DISCUSSION: *P. Scortechinii* is a member of the section *Rykia*. It was briefly described by Martelli only in a key. This was valid publication but regrettably brief. He based his new species upon collections from Malaya and upon three collections by Wray from Assam in northern India. Later Martelli restricted the area of his own species, as in his enumeration (*Webbia* 4(1):30, 1913) he listed it as an accepted species and gave its occurrence only as "Penis. Males." Thus, Martelli by implication excluded the specimens from Assam, which the writer is now separating as a new species. Of the several collections from Malaya, the one from Larut, *Dr. King's Collector* 3,557, is here designated as lectotype.

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FIG. 224. *Pandanus Scortechinii* Martelli, from isotype (SING). *a*, leafy branch, lateral view,  $\times \frac{1}{2}$ ; *b*, syncarp, lateral view,  $\times 1$ ; *c*, drupe, lateral view,  $\times 1$ ; *d*, drupe body, longitudinal median section,  $\times 1$ ; *e*, drupe, lateral view,  $\times 4$ ; *f*, drupe body, longitudinal median section,  $\times 4$ ; *g*, drupe, apical view,  $\times 4$ ; *h*, pileus, style, and stigma, lateral view,  $\times 4$ ; *i*, leaf base, lower side,  $\times 1$ ; *j*, leaf middle, lower side,  $\times 1$ ; *k*, leaf apex, lower side,  $\times 1$ .